

interpretation of all these facts except that under natural conditions fluctuations are selected and inheritance is blended?

He lays stress on the circumstance that man is not amenable to experiment; but man is not the only species that has natural varieties. May I, in turn, lay stress on the fact that it seldom pays the cultivator to select small differences (fluctuations)? Of necessity he selects mutations. The Mendelian experimenter has practically limited himself to the materials so created. He himself chooses for his experiments, and can choose, only glaring differences. In other words, he has, *qua* experimenter, absolutely no acquaintance with the small differences (fluctuations) which normally distinguish mating individuals in natural breeding. He judges the normal from the abnormal, the rule from the exception, and then appeals to earth to note the precision of his methods and thanks heaven he is not as other men, even as mere observers who seek to take the whole of the facts into consideration. Notwithstanding his parade of exactness, his belief that he reproduces natural conditions "is an assumption which still lacks the support of facts." Once more, therefore, let me challenge Mr. Lock and his comrades. If Mendelism deals with any other problem but that of sex, what is that problem? If no other problem can be named, what is the evidence that Mendelism deals with anything more than those abnormalities of sexual reproduction which occur under conditions of artificial selection? As I say, I do not ask for the solution of any problem. I ask only for an indication that Mendelism has any conceivable bearing on it. If the latter question also cannot be answered, then by all means let Mendelians pursue their very interesting studies; but let it be understood that "the new science of genetics" implies, not the study of heredity in general, but only the study of certain curiosities of artificial breeding.

G. ARCHDALL REID.

Southsea, October 20.

#### Pagan Survivals and Christian Adaptations.

It may interest some of the readers of NATURE to find that the institution of the "kern-baby" (corn-baby) still exists in our island; and a writer in the *Christian World* for October 3 was present at the bringing home, on the last load, of this Pagan institution, and was present at the harvest supper this year, when the effigy was honoured by being placed on the table. It was, presumably, only a survival of olden time, when our ancestors "ate and drank" with their gods—especially the gods of agriculture (Judges, 9, v. 27).

Again, I received a letter the other day from the rector of Fobbing, Essex (formerly rector in the Scilly Islands), informing me, in reply to an inquiry, that the Beltane fires are, up to the present day, lit there on the highest point of the islands on May eve, just as our ancestors lit them in honour of the rise of Baal (or the sun). My informant, who has only left the islands two years, often witnessed the jumping of the youths "through the fire." I should be very pleased to learn of any ancient customs of this kind still carried out on the eves of "May Day," "Easter," "All Hallows," "Christmas," or other solstitial and equinoctial periods, and not heretofore recorded in standard books on the subject. In trying to ascertain the uses of certain stone circles and monster cromlechs this evidence is of great importance, as the early missionaries purposely "adapted" so many of the Pagan festivals to Christian worship. Wales is the most promising field.

J. W. HAYES.

West Thurrock Vicarage, Grays, Essex, October 16.

#### The "Quaternary."

IN reply to Dr. Wright's comment on my letter (p. 639), I would point out that the restricted use of the word "Quaternary" appears to be confined to anthropologists. Geologists (Sir Archibald Geikie, Prof. Kayser, and Prof. Lapworth, for instance) who employ the term include in it everything from the commencement of the Glacial period to the present time.

JOHN W. EVANS.

Imperial Institute, October 25.

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#### THE "MAURETANIA."

THE first impression of the *Mauretania* is one of colossal size, the last is wondering amazement at the forethought and design which appear in details, trivial in themselves, but of supreme importance to individual comfort, of the fittings. Only those who saw the ship in the narrow waters of the Tyne can realise her huge dimensions. Eight hundred feet long herself, she floated abreast the builders' yard in a river less than 900 feet wide, which runs in a narrow cleft between low hills. In that narrow valley the great bulk of the ship made a prodigious spectacle, and over the valley before the start on the maiden voyage the smoke from her four great funnels moved like a pall.

In the brief voyage from the Tyne to the Mersey which took place last week, some of the peculiar features of the great ship were revealed. The Tyne is winding and narrow, and on the Tuesday afternoon its course was obstructed by crowds of steamers laden with sightseers. In this difficult passage the handiness of the vessel was at once apparent. Proceeding under her own steam, steered by propellers and the rudder, she was easily manœuvred at the sharp bends. To the writer, who was on the bridge at the time, it was obvious that the great turbines, which in the aggregate can develop 70,000 h.p., can be stopped or started with ease and certainty.

At sea, though the recurrent shocks characteristic of vessels fitted with reciprocating engines are absent, vibration is noticeable, though relatively slight. Generally speaking, it is maximal in the after-part and diminishes thence to the bows. The distribution, however, is erratic, regions of maximal vibration often being close to regions of minimal vibration. In the great dining saloon at 22 knots the tremors were barely noticeable, being something like the passage of a vehicle in a street outside. On the other hand, a region of marked vibration was forward of this, about the level of the second funnel.

The cause of the vibration in turbine-propelled ships is not at all obvious, and experts at present seem to be unprovided with a satisfactory hypothesis. The turbines themselves are singularly free from it. Leaning against their great steel shells one is not conscious of a movement. In the shaft tunnels, however, it is very marked. The vibration has been referred to the impact of the water thrown by the blades of the wing propellers against the sides of the ship, to the unequal thrusts which each blade exerts in the course of each revolution, and to the formation of twisting couples between the propellers when they synchronise in certain ways. Inequalities in the thrust arise from the fact that owing to skin friction the water near the side of the ship is dragged bodily along with it. Each blade, therefore, as it revolves, passes through water moving in the direction of the ship to water which, relatively speaking, is still.

The vibrations themselves are markedly periodic, mounting by a long crescendo to a climax, followed usually by complete quiet. This periodic nature unquestionably suggests a dependence upon synchronism between propellers on opposite sides of the ship, and it was found in the case of, I believe, the *Deutschland* that vibration was much lessened when her twin screws were set to rotate respectively at 70 and 80 times a minute instead of both being at approximately the same rate. The whole subject is being investigated on the *Mauretania* by means of the pallograph, which registers at the same time the shaft movements and the vibrations.

As it is not possible to get an indicator diagram of a turbine, the work done is measured on the

*Mauretania* by torsion meters directly applied to each shaft. Two wheels are fitted on the shaft at some distance apart, each of which in its rotation makes an electrical contact. The contacts are exactly in line, and therefore are coincident in point of time when the shaft is at rest. When the shaft is rotated it suffers torsion, and the aft contact lags behind the forward one. The angle of the lag measures the torsion. The instrument is calibrated by determinations made in the shops of the twist which the shaft suffers from couples of known magnitude. In the navigating house of the *Mauretania* are four dials, on each of which a hand revolves in the direction and at the speed of the particular propeller shaft to which it is attached. It is obvious that the torsion meter might be so adjusted as to give direct records on the bridge of the work of each turbine from moment to moment.

The two most impressive parts of the machinery are the controlling platform, already mentioned, of the engine-room, where a few small levers control the gigantic forces pent up in the long polished barrels of the turbines, and the small, easily manipulated wheel in the wheel-house, which, by means of a small hydraulic motor, controls the enormous steering engine sunk below water level some 650 feet distant!

The plates of the *Mauretania* were delivered rolled to a guaranteed thickness. This is, I believe, a new departure in the building of English merchant ships, and it enabled the builders to save 500 tons of dead weight. The use of silicon steel in the boilers effected a further saving of 500 tons, making a total of 1000 tons, which, reckoned as cargo, represent a gain to the Cunard Company of about 22,000*l.* a year in the earning power of the vessel. An interesting saving in dead weight was also effected in connection with the decoration. The lifts in the well of the main staircase are enclosed by a beautiful piece of metal work adapted from existing sixteenth-century wrought-iron work. It is carried out in aluminium instead of iron, and thereby 20 tons weight is saved. One wonders whether the high affinity of the metal for chlorine and the presence of chlorides in sea air have been adequately taken into account.

The engine-room of the *Mauretania*, despite the absence of the main reciprocating engines, is very closely packed, and the greatest ingenuity is manifested in the arrangements. The four main turbines, each of 15,000 h.p., are controlled from a tiny platform by six small levers. Over the great engine-room steam pipes arch large enough for a boy to walk through, and the exhaust from each low-pressure turbine passes through a "pipe" 14 feet by 16 feet! The distinctive noise of the engine-room is the continuous roar of the steam passing through the main steam pipes. The engine-room, counting main turbines, turbo-generators, and auxiliary engines, holds machinery capable of developing something over 80,000 h.p., and the rotating mass of the main turbines amounts to about 600 tons, and rotates about 200 times a minute.

The gigantic low-pressure turbines receive the steam at nearly atmospheric pressure, which falls to a condenser pressure of about minus 27 inches of mercury. Ingenious gauges are fitted on each turbine, which record the pressure at different steps in the expansion, so that, should some of the blades become stripped, the injury can be at once located.

The stokeholds are so efficiently ventilated by powerful fans as to be cool save when the furnace doors are actually opened, in spite of the presence of 192 furnaces.

The magnitude of the strains which a ship nearly the length of the Houses of Parliament must experience in a heavy head sea is brought to mind by the provision which has been made for bending. The boat deck, together with the deck houses on it, which contain the long suite of public rooms, are cut completely through in three places, so as to allow the ship to give longitudinally.

No description can give the effect of the stately progress of so great a ship down the narrow Tyne. The grey autumn day, the cheering crowds piled on the hill-sides to their summits, and the anxious pilot striving to make his orders heard amid the clamour of steam whistles and fog signals, are vivid recollections. So, too, are the raucous blasts of welcome flung to us from the great headlands as we passed them by. The sombre cliffs of the Pentlands in the grey dawn, Cape Wrath under the autumn sun, lonely light vessels, tiny fishing craft, and liners, each after its own fashion wished us the freedom of the seas.

W. B. HARDY.

### THE GEOLOGICAL SUCCESSION IN SOUTH AFRICA.<sup>1</sup>

EVERY year our knowledge of the geological succession in South Africa becomes more extended as a result of the labours of the Geological Commission of the Cape, the Geological Survey of the Transvaal, and the host of private workers who contribute to the Transactions of the Geological Society of South Africa. The newly published Report of the Cape Commission for the year 1906, and the Transactions of the Geological Society for the period January to June of this year, are full of interesting matter. The Cape surveyors have been working in Bechuanaland and Griqualand West, and have thus come into close contact with the work of the Transvaal geologists; for although the operations of the official Survey of the Transvaal have as yet been confined to the Pretoria and Middelburg districts, the Marico district and the neighbourhood of Mafeking have been explored by unofficial geologists in the employ of big land companies. Pioneer work of this nature, although unsanctified by official publication, is not to be contemned, since in many cases it is done, under conditions of considerable difficulty, by enthusiastic geologists and keen observers whose labours have often laid the foundation for the detailed work of the Government surveyors.

The earliest work in Griqualand West was by Mr. G. W. Stow, who communicated some of his results to the Geological Society of London (Q.J.G.S., vol. xxx., pp. 581-680, 1874). Unfortunately, a considerable proportion of his observations was embodied in reports to the Griqualand West Government, which since they were handed in have never emerged from their pigeon-holes. However, his classification of the Griqualand West rocks has, with the exception of the Keis series, been adopted by the Cape Survey. It is as follows:—

Matsap Series...	Quartzites and conglomerates (unconformity)
Griquatown Series...	Magnetite-jasper rocks
Campbell Rand Series...	Limestone and quartzite
Keis Series...	Quartzites and mica schists

<sup>1</sup> Eleventh Annual Report of the Geological Commission of the Colony of the Cape of Good Hope, 1906. (Capetown, 1907.)  
Geological Map of the Colony of the Cape of Good Hope. Sheet xlv. (Published by the Geological Commission, 1907.)  
Transactions of the Geological Society of South Africa. Vol. x., January to June, 1907. Pp. 1-68. (Johannesburg, 1907.)